REMARKS

The Office Action dated September 3, 2008 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 8, 9, 11, 12, and 16 have been amended to more particularly point out and distinctly claim the subject matter of the invention. Claims 6, 7, 13, 14, and 21-24 have been cancelled without prejudice or disclaimer. New claims 25 and 26 have been added. No new matter has been added. Claims 1-5, 8-12, 15-20, and 25-26 are currently pending in the application and are respectfully submitted for consideration.

The Office Action rejected claims 21-24 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. As discussed above, claims 21-24 have been cancelled and, therefore, this rejection is rendered moot.

Claims 6-7 and 13-14 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Claims 6-7 and 13-14 have also been cancelled and, therefore, this rejection is also rendered moot.

Claims 1, 3, 4, 8, 15, 17 and 18 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hunton (U.S. Patent No. 7,095,798) in view of Ricks (U.S. Patent Pub. No. 2002/0152253). This rejection is respectfully traversed for at least the following reasons.

Claim 1, upon which claims 2-7 are dependent, recites a method which includes generating a residual signal from a multicarrier signal, the residual signal representing a difference between the multicarrier signal and a hard-clipped multicarrier signal. The method also includes applying a least squares function to the residual signal for at least one carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier, and combining the minimized residual signals and the multicarrier signal.

Claim 8, upon which claims 9-14 are dependent, recites an apparatus comprising a generator configured to generate a residual signal from a multicarrier signal, the residual signal representing a difference between the multicarrier signal and a hard-clipped multicarrier signal. The apparatus also includes an applying unit configured to apply a least squares function to the residual signal for at least one carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier. The apparatus also includes a combining unit configured to combine the minimized residual signals and the multicarrier signal.

Claim 15, upon which claim 16 is dependent, recites a system comprising a transmitter apparatus configured to reduce a peak-to-mean ratio of a multi-carrier signal, a generating unit configured to generate a residual signal from a multicarrier signal, the residual signal representing a difference between the multicarrier signal and a hard-clipped multicarrier signal. The mobile communication system also includes an applying unit configured to apply a least squares function to the residual signal for at least one

carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier, and a combining unit configured to combine the minimized residual signals and the multicarrier signal.

Claim 17 recites an apparatus including generating means for generating a residual signal from a multicarrier signal, the residual signal representing a difference between the multicarrier signal and a hard-clipped multicarrier signal. The apparatus also includes applying means for applying a least squares function to the residual signal for at least one carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier, and combining means for combining the minimized residual signals and the multicarrier signal.

Claim 18 recites a system including transmitting means for reducing a peak-to-mean ratio of a multicarrier signal, and generating means for generating a residual signal from the multicarrier signal, the residual signal representing a difference between the multicarrier signal and a hard-clipped multicarrier signal. The mobile communication system further includes applying means for applying a least squares function to the residual signal for at least one carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier, and combining means for combining the minimized residual signals and the multicarrier signal.

Therefore, embodiments of the present invention relate to the reduction of the peak-to-mean average amplitude in a signal transmitted in a power amplifier, and particularly, but not exclusively, to such reduction in the power amplifier of a

multicarrier communication system utilizing an EDGE clipper. Embodiments of the present invention apply a least squares function in order to minimize a cost function with respect to the signal properties that must be maintained and the amount of clipping required for a residual signal that can be used to reduce signal peaks in the composite signal. The use of the least squares function allows embodiments of the present invention to be used in relation to EDGE systems.

As will be discussed below, the combination of Hunton and Ricks fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the advantages and features discussed above.

Hunton discloses a system and method for post filtering peak power reduction in multi-carrier communications systems. The system includes a plurality of communication signal sources each providing a band limited communication signal. A plurality of frequency converters offset the frequency of the plural band limited communication signals and a first combiner combines the plural frequency offset band limited communication signals to form a band limited multi-carrier communication signal. A peak reduction unit is coupled to receive the band limited multi-carrier communication signal and provide a band limited peak reduced multi-carrier output signal. The peak reduction unit comprises a peak reduction calculation circuit for providing a peak reduction correction signal determined from the communication signal and a signal peak limit value, a plurality of correction filters for filtering the peak reduction correction signal and providing a plurality of band limited peak reduction

correction signals, and a second combiner for combining the band limited multi-carrier communication signal and the plurality of band limited peak reduction correction signals to provide a peak reduced multi-carrier output signal band limited in plural bands.

Ricks discloses a method for analyzing data, characterized by a set of scalars and a set of vectors, into components related by statistical correlations. The method includes receiving a set of a scalars and a set of vectors as the inputs, calculating a correlation direction vector associated with the scalar and vector inputs, calculating the inner products of the input vectors with the correlation direction vector, multiplying the inner products onto the correlation direction vector to form a set of scaled correlation vectors, and subtracting the scaled correlation vectors from the input vectors to find the projections of the input vectors orthogonal or substantially orthogonal to the correlation direction vector. The outputs are the set of scalar inner products and the set of vectors orthogonal or substantially orthogonal to the correlation vector.

Applicants respectfully submit that the Office Action has failed to provide a prima facie case for obviousness under 35 USC §103. In particular, Applicants submit that a person of ordinary skill in the art would not be motivated to combine Hunton with Ricks to yield the claimed invention, and that the Office Action has failed to articulate such a motivation, as will be discussed below.

Although Ricks mentions a "least squares" filter, Applicants respectfully assert that a person of ordinary skill in the art would not be motivated to apply Ricks to the teaching of Hunton. Ricks is directed to an entirely different field from Hunton and the

present invention. More specifically, Applicants submit that a person of ordinary skill in the art would not be motivated to combine the teachings of Ricks with Hunton since Ricks does not relate to multi-carrier signals. In addition, Ricks does not relate to applying the least squares function to a residual signal which represents a difference between the multi-carrier signal and a hard-clipped multi-carrier signal. Furthermore, Ricks does not even disclose adapting a signal using least square technique.

Ricks does not relate to a system using an EDGE clipper but predominantly to a "method of analysing data" and to "find the part of data that best matches a steering vector" (see Ricks, Column 12). As such, Ricks is directed to a different field of application from both Hunton and the present invention.

In Hunton, a hard clipped correction signal is provided to a number of filter channels each comprising a multiplier and a correction filter. The given constants provided to each multiplier control the burden of peak power suppression distribution to each allocated transmit band, and must be carefully chosen. Applicants submit that a person of skill in the art would not be motivated to replace the filter channels of Hunton with a least squares technique as illustrated figure 2 of Ricks. According to Ricks, the least squares is applied merely to samples (see Ricks, paragraph 0012). A person of ordinary skill in the art would not be motivated to apply Ricks to continuous signals, and a person of ordinary skill would not be prompt to replace it with a technique like least squares used for analysis.

In addition, Applicants submit, considering figure 3 of Hunton and figure 2 of Ricks, a person of ordinary skill in the art would not readily envision that the complex functionality of Hunton could be replaced to the simplistic circuitry of Ricks, which has only a gain B and least squares filter. This would be especially difficult since Hunton separates the signal into sub-signals representing frequencies/carrier, and Ricks just includes a single signal. Moreover, Ricks does not apply the simpler function to a clipped signal and, therefore, does not provide a motivation for a person of skill in the art to attempt such an application.

With respect to a motivation to combine Hunton and Ricks, the Office Action merely states that "it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the teachings of Ricks et al. in the method of Hunton to increase the efficiency of the method" (Office Action, page 5). The Office Action does not provide any indication as to how or why the skilled person would apply Ricks to Hunton.

As outlined in MPEP §2142, "The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1396 (2007) noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that 'rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal

conclusion of obviousness.' *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). See also *KSR,* 550 U.S. at ___ , 82 USPQ2d at 1396 (quoting Federal Circuit statement with approval)."

Applicants submit that the Office Action has merely provided the conclusory statement that "it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the teachings of Ricks et al. in the method of Hunton to increase the efficiency of the method" (Office Action, page 5). The Office Action did not provide an articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.

In view of the above, Applicants respectfully submit that the Office Action has failed to provide a prima facie case for obviousness under 35 USC §103. Accordingly, Applicants respectfully submit that claims 1, 3, 4, 8, 15, 17 and 18 are not rendered obvious by the combination of Hunton and Ricks. Applicants therefore respectfully request that this rejection be withdrawn.

Claims 16 and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hunton in view of Ricks, and further in view of Wright (U.S. Patent No. 7,061,990). This rejection is respectfully traversed for at least the following reasons.

Hunton and Ricks are discussed above. Wright discloses a method and apparatus for reducing a peak to average signal level exhibited by single or by multicarrier multibearer waveforms.

Claims 16 and 19 are dependent upon claims 15 and 18, respectively. As discussed above, the Office Action has failed to establish a proper prima facie case for obviousness with respect to claims 15 and 18. As such, the combination of Hunton, Ricks, and Wright is also improper. Therefore, claims 16 and 19 should also be allowed for at least their dependence upon claims 15 and 18, and for the specific limitations recited therein.

Claims 2, 5, 9-12 and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hunton in view of Ricks, and further in view of Roux (U.S. Patent Pub. No. 2003/0137949). This rejection is respectfully traversed for at least the following reasons.

Hunton and Ricks are discussed above. Roux discloses a method and an electronic circuit for clipping of at least first and second input signals to provide an output signal which does not exceed a predefined threshold. The electronic circuit comprises input means for inputting of a first sample of the first input signal and of a second sample of the second input signal, means for applying a criterion on the first and second samples, means for clipping the first and/or second sample if the criterion is fulfilled in order to enable subsequent filter and summation operations of the first and second input signals such that the predefined threshold is not exceeded.

Claims 2, 5, 9-12 and 20 are dependent upon claims 1, 8, and 17, respectively. As discussed above, the Office Action has failed to establish a proper prima facie case for obviousness with respect to claims 1, 8, and 17. As such, the combination of Hunton,

Ricks, and Roux is also improper. Therefore, claims 2, 5, 9-12 and 20 should also be allowed for at least their dependence upon claims 1, 8, and 17, and for the specific limitations recited therein.

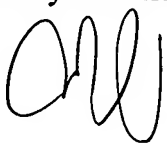
Claims 21 and 23-24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hunton in view of Ricks, and further in view of Langberg (U.S. Patent No. 5,852,630). Claim 22 was rejected under 35 U.S.C. §103(a) as being unpatentable over Hunton in view of Ricks and Langberg, and further in view of Roux. As discussed above, claims 21-24 have been cancelled. Accordingly, these rejections are rendered moot.

Applicants respectfully submit that the cited prior art fails to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 1-5, 8-12, 15-20, and 25-26 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



Majid S. AlBassam
Registration No. 54,749

Customer No. 32294
SQUIRE, SANDERS & DEMPSEY LLP
14TH Floor
8000 Towers Crescent Drive
Vienna, Virginia 22182-6212
Telephone: 703-720-7800
Fax: 703-720-7802

MSA:jf